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**ABSTRACT**

The National Science Foundation (NSF) annually collects and analyzes data on Federal obligations to individual universities and colleges for both science/engineering (S/E) and non-S/E activities. The survey data are submitted by the 15 Federal agencies with the largest programs in support of academic S/E activities and represent the only source of statistics on Federal obligations to individual academic and nonprofit institutions. Highlights of these data are provided and discussed, accomplished by two tables (Federal obligations to universities and colleges by type of activity: FY 1978-81 and Federal obligations to the 100 universities and colleges receiving the largest amounts: FY 1981) and one graph (Federal obligations to universities and colleges by type of activity). Federal support for S/E research and development (R&D), R&D plants, and non-R&D S/E activities are considered. (Author/JN)

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## Federal Science/Engineering (S/E) Support to Universities and Colleges Rose by 6% in FY 1981; Non-S/E Support Down 25%

The National Science Foundation (NSF) annually collects and analyzes data on Federal obligations to individual universities and colleges for both science/engineering (S/E) and non-S/E activities. The survey data are submitted by the 15 Federal agencies with the largest programs in support of academic S/E activities and represent the only source of statistics on Federal obligations to individual academic and nonprofit institutions. These agencies accounted for over 98 percent of all Federal obligations for academic research and development and about 95 percent of all Federal obligations to academia for all purposes. Data presented here are in current-dollar terms except where specified as constant 1972 dollars, based on the gross national product (GNP) implicit price deflator.

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### Highlights

- Despite a 6-percent increase in Federal academic S/E funds in current dollars, Federal obligations to universities and colleges for all S/E plus non-S/E activities combined declined by 7 percent from Fiscal Year (FY) 1980 to FY 1981 to \$7.7 billion. When discounted for the effects of inflation, the decline amounted to 15 percent, much higher than the average annual 3-percent decrease in real-dollar Federal support that occurred from 1978 (the peak year) to 1980.<sup>1</sup> The dropoff in total funding is attributable to non-S/E programs, down from \$3.5 billion in 1980 to \$2.6 billion in 1981, primarily as the result of reductions in Pell Grants and Supplementary Educational Opportunity Grants (SEOG's) by the Department of Education. Pell Grants, which totaled \$2.5 billion in 1981, are scheduled to decline to \$1.8 billion in 1983; no funds are budgeted for the SEOG program in 1983.<sup>2</sup>
- Federal support for academic research and development (R&D) activities rose 6 percent in current-dollar terms from 1980 to 1981. When discounted to reflect the effects of inflation, the funding level dropped by 3 percent. In the preceding 3-year period, 1978-80, support for these activities averaged a 2-percent per year gain in real terms. The current-dollar increase of 4 percent proposed in the 1984

budget would bring the level of Federal academic R&D support up an average of 6 percent per year from 1982 to 1984.<sup>3</sup>

- The Department of Health and Human Services (HHS) supplied nearly one-half of all Federal academic R&D support in 1981. This agency, together with the Department of Defense (DOD), the Department of Energy (DOE), and NSF, supplied \$5 out of every \$6 devoted to academic R&D programs. DOD, with a 26-percent growth (15 percent in real terms) funded nearly three-fifths of the Federal academic R&D growth. From 1982 to 1984, academic R&D support from DOD is expected to grow by an average of 11 percent per year in current dollars.<sup>4</sup>

- Federal support for academic R&D plant totaled \$44 million in 1981, a 16-percent growth over 1980 levels, following an 18-percent increase in the previous year. NSF was the source of virtually the entire 1980-81 increase which involved providing facilities for physics research at two major universities. Despite the second consecutive annual increase in funds in this category and the largest level of current-dollar support in six years, R&D plant support in 1981 represented only 13 percent of the 1965 peak level in real dollars. Academic R&D plant is scheduled to total \$46 million in 1983.<sup>5</sup>

<sup>1</sup>In the absence of a reliable R&D cost index, the GNP implicit price deflator was used to convert current dollars to constant 1972 dollars. The GNP deflator can only indicate approximate changes in costs of R&D performance. The GNP inflation rate from 1980 to 1981 was 9.8 percent.

<sup>2</sup>Office of Management and Budget, *Appendix to the Budget of the United States Government, Fiscal Year 1983* (Washington, D.C.: Supt. of Documents, U.S. Government Printing Office), p. I-V60.

<sup>3</sup>Office of Management and Budget, unpublished data, January 1983.

<sup>4</sup>*Ibid*.

<sup>5</sup>National Science Foundation, *Federal Funds for Research and Development, Fiscal Years 1981, 1982, and 1983*, Volume XXXI (Detailed Statistical Tables) (NSF 82-326) (Washington, D.C., 1983), table C-1.

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• Funding for "other" S/E programs grew by 5 percent in 1981 (a 5-percent decline in real terms) to \$634 million. These activities include facilities and equipment for instruction; fellowships, traineeships, and training grants; general support for S/E activities; and all other S/E activities.

• The 19 university-administered federally funded research and development centers (FFRDC's) received a 3-percent increase in 1981 for S/E activities, totaling \$2.2 billion. Virtually all S/E activities at these organizations were for R&D activities and R&D plant. In real terms, however, they received 6 percent less than in 1980, the first real decline in funding in three years.

### Federal Support to Universities and Colleges

The 7-percent decline in Federal obligations to universities and colleges (15 percent in real dollars) from 1980 to 1981 was the result of reduced support for non-S/E activities, primarily for Pell Grants and SEOG Grants by the Department of Education's Office of Student Financial Assistance (table 1). That agency reported a total of \$2.2 billion in 1981 for academic non-S/E programs, down from \$2.8 billion in 1980. Pell Grants constituted approximately two-thirds of all Federal student assistance and amounts ranged from \$200 to \$1,670 per student; in 1981 they supported 2.6 million higher education students. The maximum size of the individual grants was reduced to \$1,600 in 1983, and about 1.8 million students will receive Pell Grants averaging \$800 by 1984. The SEOG's are designed to complement Pell Grants for low- and middle-income students attending higher cost academic institutions and were awarded to 645,000 students in 1981; in 1983, 440,000 students are expected to utilize SEOG's, but none in 1984.\*

In 1981, 100 institutions accounted for 65 percent of all Federal support to universities and colleges, a slightly higher concentration than their 61-percent share in 1980. This shift resulted from the steep decline in support for non-S/E activities which are much more widely distributed than academic science support. In 1981, over five-sixths of all Federal academic R&D funds were concentrated among these leading 100 universities; less than one-third of all non-S/E support was distributed to those same institutions. Seventeen of the leading 20 recipients of Federal support were also among the top 20 R&D performers (table 2).

Howard University was the leading recipient of Federal funds among the 105 historically black colleges (HBC's) in 1981 and ranked third in total Federal support. Howard received over one-third of the \$423 million total obligated to all HBC's. Total support to all HBC's, over four-fifths of which went for non-S/E activities, declined by 3 percent in 1981.

### Academic S/E Activities

Federal support for academic S/E activities grew in 1981 to a new high of \$5.1 billion but declined in real terms for the second consecutive year—this time by nearly 4 percent. This contrasts with a 1-percent real-dollar increase averaged over the 1978-80 period in funding for these programs.

**Table 1. Federal obligations to universities and colleges by type of activity: FY 1978-81**

[Millions of dollars]

| Type of activity                               | 1978    | 1979    | 1980    | 1981    |
|------------------------------------------------|---------|---------|---------|---------|
| Total                                          | \$7,472 | \$7,604 | \$8,296 | \$7,719 |
| Academic science/engineering                   | 3,960   | 4,473   | 4,601   | 5,087   |
| Research and development                       | 3,386   | 3,874   | 4,158   | 4,409   |
| R&D plant                                      | 34      | 32      | 38      | 44      |
| Other science/engineering activities, total    | 539     | 567     | 605     | 634     |
| Facilities and equipment for instruction       | 4       | 6       | 4       | 5       |
| Fellowships, traineeships, and training grants | 206     | 205     | 223     | 215     |
| General support for science/engineering        | 74      | 92      | 92      | 93      |
| Other science/engineering activities           | 255     | 263     | 287     | 321     |
| Non-science/engineering                        | 3,512   | 3,131   | 3,495   | 2,632   |

NOTE: Detail may not add to totals because of rounding.  
Source: National Science Foundation

### RESEARCH AND DEVELOPMENT

A 6-percent growth in Federal support for academic research and development was reported from 1980 to 1981; the \$4.4 billion total allotted for academic R&D support represented over a 3-percent decline in real dollars (chart 1). According to Federal budget projections, a 4-percent increase for academic R&D activities is slated for 1984 in current dollars, a 6-percent per year growth from 1982 to 1984. Nearly nine-tenths of this support is earmarked for research alone; the development component constitutes only a fraction of all university R&D efforts. Historically, over one-half of Federal academic R&D funds have been awarded for basic research projects.

Ten of the 15 surveyed Federal agencies reported current-dollar increases for academic research and development in 1981, but only 6 agencies funded R&D programs at growth rates exceeding inflation.

Of the 626 academic institutions receiving Federal R&D support in 1981, the leading 100 institutions received 85 percent of the total. In 1963, the first year of the survey series, the leading 100 R&D performers (out of a total of 492 R&D recipients) received 90 percent of all R&D funds. The top 100 R&D performers in 1981 received 91 percent of all DOD funding, 88 percent of both DOE's and HHS' R&D total, but only 66 percent of all R&D support from the Department of Agriculture (USDA). The proportion of USDA funding was relatively low because most agricultural research is performed by land-grant institutions that are outside of the leading 100 R&D performers.

Johns Hopkins University was not only the leading recipient of all Federal academic funding but also continued as the leading recipient of R&D support. As in 1980, Massachusetts Institute of Technology (MIT) with \$146 million and Stanford University with \$106 million ranked second and third, respectively.

### R&D PLANT

Federal support for R&D plant reached \$44 million in 1981, a 16-percent current-dollar growth that followed an

\*Office of Management and Budget, *ibid.*, Fiscal Year 1982, p. I-112, and Fiscal Year 1983, p. I-V60.

**Table 2. Federal obligations to the 100 universities and colleges receiving the largest amounts: FY 1981<sup>1</sup>**

[Dollars in thousands]

| Rank                      | Institution                          | Total, all activities | Research and development | R&D rank |
|---------------------------|--------------------------------------|-----------------------|--------------------------|----------|
| Total, all institutions   |                                      | \$7,718,994           | \$4,409,143              |          |
| 1                         | Johns Hopkins Univ <sup>2</sup>      | 378,608               | 363,429                  | 1        |
| 2                         | Mass Inst of Technology              | 164,782               | 146,035                  | 2        |
| 3                         | Howard Univ <sup>3</sup>             | 153,335               | 7,996                    | 117      |
| 4                         | Univ of Washington                   | 128,147               | 99,965                   | 4        |
| 5                         | Stanford Univ                        | 125,645               | 106,073                  | 3        |
| 6                         | Univ of Wis-Madison                  | 115,517               | 86,918                   | 8        |
| 7                         | Univ of Cal-Los Angeles              | 112,650               | 95,210                   | 5        |
| 8                         | Harvard Univ                         | 106,361               | 87,630                   | 7        |
| 9                         | Univ of Cal-San Diego                | 101,718               | 91,403                   | 6        |
| 10                        | Univ of Minnesota                    | 100,383               | 72,001                   | 14       |
| Total 1st 10 institutions |                                      | 1,487,146             | 1,156,860                |          |
| 11                        | Cornell Univ                         | 100,345               | 72,671                   | 13       |
| 12                        | Columbia Univ-Main Div               | 99,084                | 83,659                   | 9        |
| 13                        | Univ of Michigan                     | 94,118                | 73,999                   | 11       |
| 14                        | Univ of Pennsylvania                 | 93,655                | 76,136                   | 10       |
| 15                        | Yale Univ                            | 88,084                | 73,526                   | 12       |
| 16                        | Univ of Cal-San Francisco            | 82,156                | 64,814                   | 15       |
| 17                        | Univ of Cal-Berkeley                 | 77,966                | 64,065                   | 16       |
| 18                        | Pennsylvania State Univ <sup>3</sup> | 72,303                | 47,007                   | 21       |
| 19                        | Univ of Ill-Urbana                   | 65,993                | 53,580                   | 19       |
| 20                        | Ohio State Univ                      | 68,462                | 42,899                   | 26       |
| Total 1st 20 institutions |                                      | 2,333,612             | 1,809,308                |          |
| 21                        | Univ of Chicago                      | 63,565                | 53,992                   | 18       |
| 22                        | Univ of Colorado                     | 63,158                | 48,146                   | 22       |
| 23                        | Washington Univ                      | 62,557                | 54,170                   | 17       |
| 24                        | Michigan State Univ                  | 60,617                | 34,000                   | 37       |
| 25                        | Univ of Southern Cal                 | 59,597                | 49,221                   | 20       |
| 26                        | Duke University                      | 54,189                | 44,287                   | 23       |
| 27                        | Univ of NC at Chapel Hill            | 52,815                | 38,447                   | 30       |
| 28                        | Univ of Rochester                    | 52,599                | 42,983                   | 25       |
| 29                        | New York Univ                        | 52,138                | 40,636                   | 28       |
| 30                        | Texas A&M Univ                       | 51,938                | 34,398                   | 36       |
| Total 1st 30 institutions |                                      | 2,906,785             | 2,247,588                |          |
| 31                        | Gallaudet College <sup>4</sup>       | 51,204                | 580                      | 270      |
| 32                        | Univ of Texas at Austin              | 50,955                | 43,756                   | 24       |
| 33                        | Purdue Univ                          | 50,523                | 36,549                   | 32       |
| 34                        | Yeshiva Univ                         | 49,804                | 42,590                   | 27       |
| 35                        | Univ of Pittsburgh                   | 49,291                | 38,512                   | 29       |
| 36                        | Univ of Arizona                      | 47,700                | 36,308                   | 33       |
| 37                        | Univ of Utah                         | 47,520                | 38,163                   | 31       |
| 38                        | Univ of Florida                      | 46,247                | 30,845                   | 43       |
| 39                        | Univ of Iowa                         | 45,251                | 35,300                   | 34       |
| 40                        | Indiana Univ                         | 44,662                | 29,276                   | 45       |
| Total 1st 40 institutions |                                      | 3,389,942             | 2,579,447                |          |
| 41                        | Case Western Reserve Univ            | 41,429                | 33,744                   | 38       |
| 42                        | Univ of Miami                        | 40,803                | 28,956                   | 46       |
| 43                        | Boston Univ                          | 39,754                | 27,019                   | 51       |
| 44                        | Northwestern Univ                    | 39,541                | 32,446                   | 41       |
| 45                        | Univ Alabama-Birmingham              | 35,389                | 29,970                   | 44       |
| 46                        | Univ of Cal-Davis                    | 38,158                | 31,757                   | 42       |
| 47                        | Baylor Col of Medicine               | 37,921                | 35,062                   | 35       |
| 48                        | Georgia Inst of Tech                 | 37,188                | 33,116                   | 39       |
| 49                        | California Inst of Tech              | 35,932                | 32,959                   | 40       |
| 50                        | Univ of Md College Park              | 35,914                | 27,313                   | 50       |
| Total 1st 50 institutions |                                      | 3,775,971             | 2,891,789                |          |

<sup>1</sup>Amounts shown represent awards to individual institutions, excluding the R&D obligations to university-administered federally funded research and development centers (FFRDC's). Awards to the administrative offices of university systems are excluded from totals for individual institutions because that allocation of funds is unknown, but those awards are included in "Total, All Institutions."

<sup>2</sup>Data for Johns Hopkins University include \$238 million obligated to the Applied Physics Laboratory, considered an FFRDC until FY 1978.

| Rank                       | Institution                   | Total, all activities | Research and development | R&D rank |
|----------------------------|-------------------------------|-----------------------|--------------------------|----------|
| 51                         | Oregon State Univ             | 35,148                | 27,669                   | 47       |
| 52                         | Vanderbilt Univ               | 33,916                | 27,426                   | 49       |
| 53                         | Inter Am UPR-San German       | 33,522                | 0                        | --       |
| 54                         | Univ of Connecticut           | 33,139                | 22,196                   | 55       |
| 55                         | Rutgers the St Univ of NJ     | 33,139                | 18,011                   | 68       |
| 56                         | U Tennessee-Knoxville         | 32,768                | 19,933                   | 62       |
| 57                         | Univ of Cincinnati            | 32,550                | 18,766                   | 67       |
| 58                         | Louisiana State Univ          | 32,069                | 19,005                   | 65       |
| 59                         | Univ of Virginia              | 31,740                | 24,333                   | 52       |
| 60                         | New Mexico State Univ         | 31,274                | 11,759                   | 94       |
| Total 1st 60 institutions  |                               | 4,105,236             | 3,080,887                |          |
| 61                         | Univ of New Mexico            | 30,455                | 18,976                   | 66       |
| 62                         | U Tex Hlth Sci Ctr Dallas     | 29,442                | 23,911                   | 53       |
| 63                         | NC State Univ at Raleigh      | 29,339                | 16,758                   | 73       |
| 64                         | Univ of Kentucky              | 29,157                | 12,875                   | 90       |
| 65                         | Woods Hole Oceanographic Inst | 29,097                | 27,633                   | 48       |
| 66                         | Univ of Missouri Columbia     | 28,900                | 14,477                   | 84       |
| 67                         | Colorado State Univ           | 28,879                | 21,487                   | 57       |
| 68                         | Princeton Univ                | 28,402                | 23,888                   | 54       |
| 69                         | Univ of Hawaii-Manoa          | 27,280                | 20,629                   | 58       |
| 70                         | Univ of MD Balt Prof Sch      | 27,121                | 20,414                   | 60       |
| Total 1st 70 institutions  |                               | 4,393,308             | 3,261,935                |          |
| 71                         | Univ of Mass at Amherst       | 26,873                | 15,131                   | 80       |
| 72                         | VA Polytech Inst & St Univ    | 26,488                | 16,449                   | 75       |
| 73                         | Temple Univ                   | 26,241                | 14,678                   | 82       |
| 74                         | Univ of Georgia               | 26,240                | 17,045                   | 72       |
| 75                         | Univ of Kansas                | 25,552                | 17,205                   | 71       |
| 76                         | Carnegie-Mellon Univ          | 25,434                | 21,915                   | 56       |
| 77                         | Univ of Cal-Irvine            | 25,059                | 20,614                   | 59       |
| 78                         | Virginia Commonwealth Univ    | 24,285                | 16,713                   | 74       |
| 79                         | Cuny Mt Sinai Sch of Med      | 23,519                | 19,874                   | 63       |
| 80                         | Suny at Stony Brook           | 22,377                | 19,602                   | 64       |
| Total 1st 80 institutions  |                               | 4,645,376             | 3,461,161                |          |
| 81                         | Univ of Ill Med Ctr Chgo      | 21,982                | 12,931                   | 88       |
| 82                         | Georgia Washington Univ       | 21,963                | 14,503                   | 83       |
| 83                         | Iowa St U of Sci & Tech       | 21,942                | 10,396                   | 102      |
| 84                         | Emory University              | 21,927                | 17,374                   | 70       |
| 85                         | Rockefeller Univ              | 21,767                | 19,952                   | 61       |
| 86                         | Wayne State Univ              | 21,350                | 12,582                   | 92       |
| 87                         | Tufts Univ                    | 20,935                | 15,642                   | 78       |
| 88                         | Utah State Univ               | 20,859                | 15,412                   | 79       |
| 89                         | Brown Univ                    | 20,783                | 16,020                   | 77       |
| 90                         | Suny at Buffalo               | 19,959                | 16,224                   | 76       |
| Total 1st 90 institutions  |                               | 4,858,843             | 3,612,197                |          |
| 91                         | Washington State Univ         | 19,599                | 12,896                   | 89       |
| 92                         | Univ of Vt & St Agric Col     | 18,960                | 11,950                   | 93       |
| 93                         | Univ of Dayton                | 18,672                | 15,049                   | 81       |
| 94                         | Univ of Nebraska-Lincoln      | 18,557                | 11,108                   | 97       |
| 95                         | Georgetown Univ               | 18,505                | 10,327                   | 103      |
| 96                         | Univ of Tex Cancer Center     | 18,459                | 17,789                   | 69       |
| 97                         | Syracuse University           | 18,161                | 10,689                   | 98       |
| 98                         | Univ of Cal Santa Barbara     | 17,620                | 12,686                   | 91       |
| 99                         | Oklahoma State Univ           | 17,206                | 7,028                    | 127      |
| 100                        | Mississippi State Univ        | 16,669                | 6,537                    | 133      |
| Total 1st 100 institutions |                               | 5,041,251             | 3,728,258                |          |

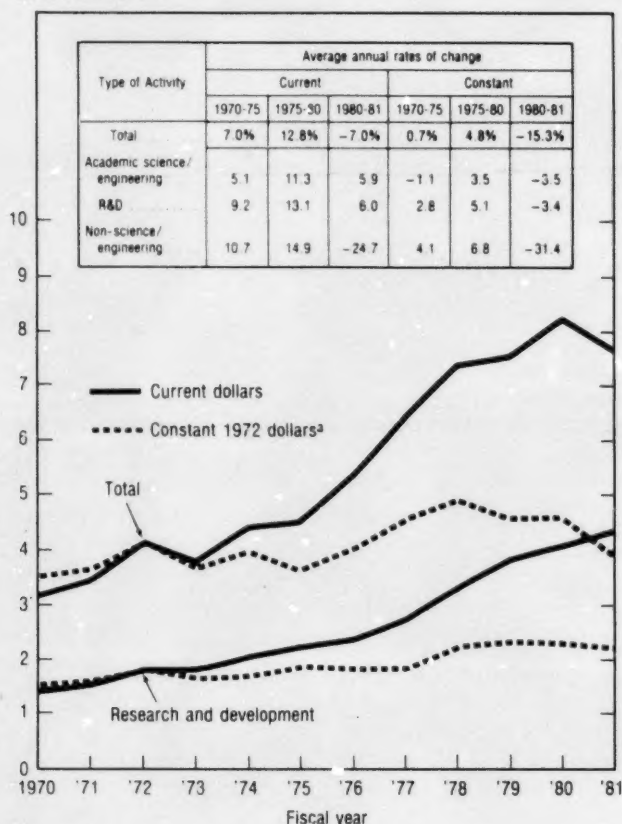
<sup>3</sup>Data for Pennsylvania State University include \$12 million obligated to the Applied Research Laboratory, considered an FFRDC until FY 1978.

<sup>4</sup>Howard University and Gallaudet College receive substantial appropriations from Congress each year for general operating expenses; their relative rankings thus reflect the magnitude of their non-science/engineering programs.

SOURCE: National Science Foundation

**Chart 1. Federal obligations to universities and colleges by type of activity**

Billions of dollars



<sup>a</sup>Based on GNP implicit price deflator.  
SOURCE: National Science Foundation

18-percent rise in the 1979-80 period. Virtually the entire 1980-81 increase was traced to NSF support, mostly for construction of accelerator facilities. In spite of the recent influx of funds, R&D plant support in 1981 represented only 35 percent (13 percent in real dollars) of the 1965 peak level of \$126 million.

Federal support for academic R&D plant are expected to reach \$46 million in 1983. According to DOD, the agency plans to provide \$150 million over a 5-year period to upgrade academic S/E research facilities, beginning in FY 1983.

### OTHER S/E ACTIVITIES

Federal support for all S/E activities other than research and development and R&D plant increased for the fifth consecutive year, this time by 5 percent to \$634 million. Support for these programs fell by 5 percent in real terms, however, making 1981 the seventh consecutive year of real-dollar decline.

Federal obligations for fellows and trainees decreased by 4 percent in 1981 (12 percent in real terms) to \$215 million. The proportion of all full-time graduate students in doctorate-granting institutions that were primarily supported under Federal fellowships and traineeships amounted to 7 percent in 1981 compared to 16 percent in 1971.<sup>7</sup>

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The final report, *Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1981*, including statistical tables presenting the survey findings in detail, will be released later in 1983. For more information on the availability of data tapes, call (202) 634-4673.

<sup>7</sup>National Science Foundation, *Academic Science/Engineering: Graduate Enrollment and Support, Fall 1981* (Detailed Statistical Tables) (NSF 83-305) (Washington, D.C., 1983), table A-13; and *Graduate Student Support and Manpower Resources in Graduate Science Education, Fall 1971* (NSF 73-304) (Washington, D.C.: Supt. of Documents, U.S. Government Printing Office, 1973), table C-10.

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